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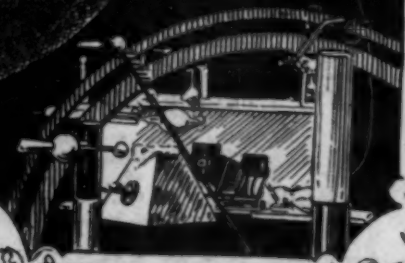
THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.



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THE AMERICAN
X-RAY JOURNAL.
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XII. CHICAGO, JUNE, 1903. No. 6

Pain.

BY J. RUDIS-JICINSKY, A. M., M. D., E.
CEDAR RAPIDS, IA.

In the consideration of the symptoms of any disease pain will be accorded the chief place, but in cases of malignant growths the intolerable and excruciating pain radiating from the lesion proper in all directions is the first thing the physician tries to control, and if he has a method which relieves without opiates and injurious drug anodynes, the advantages of such a method are apparent. We know that for the relief of pain occurring without evident cause, or which is not affected by the treatment or removal of the cause, or when the condition is incurable, the resources of medical electricity are many and various. We have galvanic, faradic, sinusoidal, high frequency and high voltage currents, static electricity, etc., which if used intelligently will in most cases relieve the pain. With the discovery of the x-rays by Prof. Roentgen in 1895 and their immediate application to the cure of disease, it was found, especially in lupus and all malignant growths, that the pain in some very obstinate cases, after a few applications of the unknown rays, was controlled or disappeared altogether, and in the excruciating pains of tubercular joints, carcinomas, and sarcomas the results are marvelous. The application of the rays is practically painless, an advantage of no small consideration. The same is true of another method, the treatment by the ultra-violet rays of light, Finsen's treatment—a method which approaches very closely the x-ray method. In Finsen's light we have highly actinic rays which are similar to those of the x-ray order produced in a Crookes tube. To produce the x-ray we have to charge the terminals of the tube with an electrical current of high tension. The violet cathode rays produced give rise to the unknown rays of green color from the anode, the rays which act upon the living tissue, producing electrolysis, stimulate the normal, and over-stimulate, irritate, injure, or destroy the abnormal, the brunt of the attack being felt first in the periphery of the nerves. This seems to explain why the pain which is most intense in some cases of malignancy is checked from the start. The results in this direction, with many apparent cures, justify the hope that in the proper use of the Roentgen rays we have a pain reliever of the greatest importance in the most intractable diseases, with all the limitations of electro-chemical action within pathological tissues. General and local sedation follows often after a few sittings of the patient, and it makes no difference whether the pain is due to acute or chronic inflammation, stretching or neuralgia, or whether it is a subjective or cutaneous pain, or any other pain of malignancy, etc. But on the other side we may have cases where

not the x-ray itself seemed to be able to control the pain, and still others where the pain is not checked at all.

It seems to us that we must have abundance of the kathode rays, which are changed into the unknown rays, to get the anodyne effects. The x-rays alone or the kathode rays alone would not do. The kathode rays may be deflected from their straight course by a magnet, or pass through substances opaque to the light and cast "shadows" of objects less opaque. They act upon the emulsion of a photographic plate, they go in straight lines independent of the position of the anode, exhibit themselves in a beautiful violet color in very high vacua, produce fluorescence of the tube, or of certain substances contained within the tube, and may be focused. The Roentgen rays, on the other hand, are highly penetrative, cannot be reflected, refracted, or polarized. The kathode rays will not influence the deeper tissues, and the deeper nerves and nerve centers (just like the ultra-violet rays) unless these are deprived of their usual blood content; but the x-rays will readily traverse the superficial tissues and influence the nutrition of the deeper one, bringing on reorganization, restitution and different changes of electro-chemical character, like its effects on many photographic plates exposed in layers at once in skiagraphy. As far as we know we cannot produce the x-rays at their best without the kathode pencil stream. The kathode rays act more superficially. We must have, therefore, the kathode rays with all the other rays, along with those of the x-ray order produced in the vacuum tube between the terminals heavily charged with electrical current, if we wish to act upon the tissues and the supplying nerves. The high frequency and high voltage currents, static electricity, and other forms of electricity may give the same results in the relief of pain.

There is no question but that some superficial cases may be treated with the ultra-violet rays, the pain being soon relieved; or with the kathode rays alone, perhaps, with high frequency and high voltage currents, static electricity, galvanism, faradism, etc., but in malignant cases the x-ray seems to give as yet the best results. No exact directions can be given in advance to cover all cases, but the conditions of each individual case will suggest the necessary technique most likely to relieve, and if we fail with a "low vacuum" tube, another of "high vacuum" may be tried. The skill which comes with experience will usually select intuitively the most successful form of application, with proper protection of the patient. There is no fixed pattern in regard to the distance of the tube, the length of the exposure, the duration of the treatment, etc. The question whether the relief of pain is due to this or that kind of current and not to the x-ray proper, to high tension, the rate of change in the energy of current action, the kathode ray alone, or other rays of light, we do not need to answer. We know that an x-ray exposure relieves pain, and in some cases controls it altogether, the patient being near the tube in action; and we do not care exactly what form of electricity palliates incurable pain during such an exposure. Such a treatment possesses the enormous advantage over morphine, antipyrin, and other drug anodynes—which in malignancy have to be given sometimes in enormous quantities—that at the same time it is giving temporary relief it is also imparting a general nutritional benefit with proper stimulation of the healthy parts and irritation and destruction of the malignant growth. In some cases the relief of pain under the exposure to the x-rays is permanent. How much we do gain by such treatment in carcinoma or sarcoma? And if these rays should even fail to cure a malignant, inoperable growth, giving temporary relief only,

they are blessed palliatives to the patient, for, unlike drug pain-destroyers which also destroy vitality, the unknown rays of Prof. Roentgen build up the forces of nutrition, destroy the growth, and if possible not only relieve the suffering but prolong life.

The great sphere of the x-ray treatment includes not only the nervous, circulatory and muscular system, but it is also well suited to pains within joints, bones, cartilages, deep viscera and deep organs. It must act upon tissues which it penetrates, the penetrative power being greater with the greater amount of energy behind the tube. If the x-ray produces electrolysis, as said before, and if its effects are distinctly electric in character, is it not self-evident that the stimulating effect must be decided upon the nerves?

Altho in most cases we are to regard pain as a sensation which resides exclusively in the nervous system and may originate from various sources, being merely a symptom, to be removed only by means which remove the lesion which causes it, there are cases in which altho it is only a symptom it constitutes a chief element of disease, and one against which we have to direct our remedies. Malignant growths, superficial or internal, are the best examples. The limitations of the character of the physiological and therapeutical work done by the x-rays are now well known. In the x-ray we have an agent that rivals vaccination and antitoxin, and one whose possibilities have not as yet been thought of; but this treatment alone is not the panacea for everything. It is one of the most certain, definite, and effective remedies to relieve pain, and the anodyne effects of the raying are not produced by local anesthesia, they do not benumb, and act so far as they are either temporary or become permanent by repeated doses, by changing disordered sensation into orderly and normal sensation.

The best skiagraphs, and the best results in the treatment with the x-ray have been obtained in the hemisphere of x-ray activity, or the field of the best rays of penetrating properties from the middle of the hot focus point of the anode. These hemispheres of activity or non-activity of the x-rays in a Crookes tube may be seen better fluoroscopically, and determined photographically if we wish to. Within the limits of this hemisphere of activity, an object opaque to the rays will cast a shadow, easily detected with the help of the fluoroscope, or by the image it produces upon the photographic plate, but to find out exactly the best point of the best rays of x-ray order, is the main part in the new art of proper diagnosis and treatment in medicine and surgery. When this point is known it is comparatively easy to secure proper illumination, the proper position of the subject in skiagraphy, and in therapy the most astonishing results.

Musical Sounds from Vacuum Tubes and Flames—(Revue des Sciences.) Following up the experiments of Mr. Duddell on the singing arc, Prof. A. Righi, of Rome, has succeeded in obtaining musical sounds from vacuum tubes. A tube with aluminum electrodes, at a distance apart of 0.05 mm. for a rarefaction of 1 cm. of mercury, is connected thru a high resistance with a battery of 800 volts, a current of a few milliamperes being allowed to flow. The tube is shunted by a condenser and a telephone in series. Musical sounds are given out. Instead of a vacuum tube the flame of a Bunsen burner may be used, and in some cases the best results are obtained when the flame is rendered a better conductor by volatilizing common salt on the electrodes.—*The Electrical Age, April, 1903.*

Electro-Therapy.

A Course of Twenty-Four Lessons under the auspices of the Chicago College of X-Ray and Electro-Therapeutics.

Lesson I.—HISTORICAL REVIEW.

Electrical phenomena were noticed before any one thot it worth while to write about them. Lightning, electric eels, electric sparks from the fur of a cat or from the human body, all have been known from prehistoric times. The earliest written record of such phenomena appears to have been made about 600 B. C., but the first known attempt to investigate and to classify such phenomena was made by Gilbert toward the close of the 16th century, a little over 300 years ago. Gilbert invented the word "electricity," to express the unknown cause of the forces of attraction which he noticed between amber, pieces of paper, etc., after they had been rubbed, deriving the name from the Greek word for amber, *elektron*. During the next 100 years, from 1600 to 1700, very little was added to our electrical knowledge. Guericke invented a static machine which consisted of a ball of sulfur revolving on an axis and rubbed by the hand. Newton improved upon this machine by using glass instead of sulfur. Several other experimenters, among which Boyle was prominent, gave attention to electrical phenomena, but the facts known at that time were too few to lead to any valuable generalizations.

During the next 100 years distinct advances were made. Grey, in 1729, discovered that some substances were conductors of electricity and others insulators. Dufay, about the same time, discovered that the electric charges were of two kinds, "vitreous," which was produced by rubbing glass and which is now called positive electricity, and "resinous," which is produced by rubbing amber, paper, etc., and which is now called negative electricity. In 1745 the Leyden jar was invented, it is not quite certain by whom. This made it possible to experiment with much heavier charges of electricity than had ever been used before. Not long afterward, in 1752, Benjamin Franklin, with his famous kite, drew electric sparks from the clouds during a thunder storm, and by numerous experiments proved the identity of these with an ordinary electric spark, thus making known to the world positively for the first time the real nature of lightning. Experiments with atmospheric electricity immediately became popular among students of physics, and numerous similar experiments were tried. But in the following year Richman, of St. Petersburg, was killed by a "ball of fire" from a tall metal rod during a thunder storm. This acted as a damper upon their rashness.

About this time there was a discussion regarding the nature of electricity. A fluid theory of electricity was proposed by Watson, but the two-fluid theory of Symmer attracted for the time most attention. Symmer's theory, briefly stated, considers that a positive charge is an accumulation of positive electricity and a negative charge is an accumulation of negative electricity. A given positive charge is capable of neutralizing an equal amount of negative charge, and there are unlimited quantities of both positive and negative electricity in all substances. Franklin afterwards elaborated Watson's one-fluid theory, considering a positive charge as an accumulation of the one electric fluid, and the negative charge as a diminution in the quantity of the same electric fluid, in this way explaining most of the facts then known as well as by Symmer's theory.

In the development of a new science progress is necessarily slow. At first facts must be accumulated and experiments made. Before it is possible to discover and formulate the laws of the phenomena a large number of facts must be known. A correct theory then becomes of the greatest importance in the advancement of that science. A theory of some sort, even if only approximately true, is much better than none, because it enables the investigators to classify the phenomena they find, and serves as a guide, tho a faulty one, for further investigation. Fluid theories of electricity, tho far from being true, have been of great value in the development of electrical science. The rapid advance made in electrical science shortly after their adoption is evidence of their value.

Up to the year 1800 practically nothing was known about electric currents. The more striking phenomena of static electricity had attracted attention almost exclusively. But in the year 1790 Galvani discovered that muscular contraction was produced in a frog's legs by contact with certain metals. This led to further investigation, and in the year 1800 Volta produced his electric "pile," which was the first form of the galvanic battery. For the next 25 years voltaic electricity monopolized the attention of investigators. In the year 1800 water was decomposed, both by the electric spark and by the current from Volta's "pile." Numerous experiments were made by Daniell, Grove, Bunsen and others, and many forms of galvanic batteries were devised, some of which are in use at the present date. The physical effects of the electric current soon came to be well understood.

In 1807 Davy, by means of a powerful electric current, decomposed quicklime and other alkaline earths which had up to that time been supposed by some to be elements.

In 1820 Oersted discovered the directive action of the electric current on a magnetic needle. From this time onward the laws of electricity and electro-magnetism were together made the subject of investigation by Arago and Davy, who in 1820 discovered electro-magnetism, Seebec, who discovered thermo-electricity in 1822, Ampere, who invented the galvanometer for the measurement of currents by their effect upon a magnetic needle and investigated very fully the laws of electricity and magnetism, and many others. Induced currents were discovered by Faraday in 1831, and the "induction coil" was brot to a high degree of perfection by Ruhmkorff. Two years afterward Faraday discovered the law of electro-chemical equivelence and constructed the voltameter, which measures a current by the amount of voltaic decomposition produced by it. In 1827 Ohm investigated the laws of electric currents and brot definiteness into electrical science by the invention of the electrical terms "electro-motive force," "current strength" and "resistance." He also formulated from theoretical considerations the relation between these three quantities in any electrical circuit, which has ever since been known as Ohm's law. The first crude dynamo was invented by Pixii before the middle of the century. In 1850 Weber produced the system of electro-magnetic units now in use and made exact work in electro-magnetic science more easy for investigators.

Thus the work that was done in electrical science during the first half of the 19th century, beginning with almost nothing, was the fairly complete elucidation of the laws and phenomena of the science; and it is due to work of such men as Ampere, Faraday and Davy that the rapid advances in the practical applications of electricity and magnetism which took place during the latter half of the century were possible. Since 1850 very little that is of fundamental importance in electricity and magnetism has been discovered.

Enormous improvements have been made in apparatus. Currents much more powerful than were then dreamed of are now produced with ease, and many phenomena which were then so slight that they could not but be overlooked have been, thru this more powerful apparatus brot into prominent notice. It has been distinctly true in electrical science that the scientist preceded the inventor, and the rapid development of inventions was made possible by the complete knowledge of electric laws which had been worked out by the scientists.

The history of electro-therapeutics may be conveniently divided into four parts: (1) the static era, which extends from the beginning of history, but more particularly from the discovery of the Leyden jar in 1745, to Galvani's experiments and the construction of Volta's pile in 1800; (2) the galvanic era, from 1800 to the construction of the faradic coil in 1831; (3) the faradic era, from 1831 to the discovery of the Roentgen rays in 1895; (4) the radiant era, since 1895.

In taking a general view of these periods it is worthy of note that the most striking progress in electro-therapeutics has been made in many cases by men outside of the medical profession, and that their discoveries have often been violently opposed by ignorant and conceited physicians. It is true that these discoverers were themselves in some cases extremely ignorant, and that their discoveries were announced along with the most absurd theories. But, just as the skilful miner is able to detect a valuable ore even when the metal is concealed by the admixture of an immense quantity of other material, so should the physician be able to recognize truths of therapeutic value wherever they are to be found.

During the static era therapeutic experiments were either entirely accidental or were made with scarcely any knowledge of the physiological effects of electricity; consequently very little that was of permanent value was then added to our knowledge. As is often the case, the more prominent and striking phenomena of the science, which were the first to be noticed, have remained for the longest time a mystery to the average student of electricity, so that altho improvements in machinery for producing static electricity have been made from time to time it is only during the last 25 years that much real progress has been made in the therapeutic applications of these currents. Dr. Morton has contributed more than any other one man to this advance. During the last six or seven years static machines have become much more popular, partly on account of improvements in manufacture and reduction of price, and partly because they can be used as the source of current for producing x-rays.

After the discovery of galvanic electricity in 1791 numerous experiments were made to determine its therapeutic value. These experimenters knew next to nothing about the physical and physiological effects of electric currents, and their experiments were necessarily crude; consequently the whole subject fell into neglect and disrepute, and it was not until long after the discovery of the faradic current that galvanic currents came to be reinvestigated. The researches of du Bois-Reymond and Pflüger in electro-physiology about 1850 were found to be of considerable value in electro-diagnosis. Remak, of Berlin, in 1855 showed the therapeutic value of the direct current and insisted that this was the only current that should be used by physicians. In 1858 W. B. Richardson made experiments in kataphoresis, but these met with strong opposition from other physicians and fell into disuse until revived by Adamkiewicz in 1886 and Peterson in 1888. The use of the direct current in medicine was made scientific by Apostoli, who in 1884 called attention to the different effects of

the positive and negative electrodes and introduced accurate measurement of the currents used. More recently Massey has applied the direct current successfully to kataphoric destruction of malignant tumors. Newman in 1867 proposed and successfully carried out his method of overcoming urethral and other strictures by the use of mild galvanic currents.

Faradic currents remained largely in the hands of charlatans until investigated thoroly by Duchenne, of Bologne, who began this work about 1847. Since that time the use of faradic currents has been more general among physicians. Its applications being comparatively limited the method has been supposed by many to be of little value. The invention of improved apparatus for producing a smoother alternating current has in recent years made it evident that the faradic currents have a far wider field of application than was formerly supposed. Beard, Rockwell, Morton and others have added much to our knowledge in this direction.

In 1873 Maxwell published his work on electricity and magnetism in which he revived Faraday's idea that an electric charge is a strain in the ether, and inferred that electric waves and waves of light are identical in their nature. Some years later Hertz succeeded in producing electric waves less than one meter long, and showed experimentally that their properties were similar to those of light, thus confirming Maxwell's theory. In 1879 Crookes published his researches on radiant matter, describing the behavior of gases in extremely high vacuum, one millionth of an atmosphere or less. In December, 1895, Roentgen described the x-rays he found issuing from the Crookes tube when excited by an electric current. In April, 1896, Dr. H. Preston Pratt found that x-rays were capable of destroying some kinds of bacteria and that the rays had marked therapeutic effects. Freund obtained similar successful therapeutic results with these rays a few months later, and during recent years a host of investigators have entered the same field. Finsen in 1895 experimented on the plan for curing malignant diseases by condensed sun light. d'Arsonval in 1893 investigated the properties of high frequency currents, and Piffard a little later modified his apparatus and constructed the hyper-static machine.

Contemporary history is the most difficult to write. No attempt is here made to apportion to living investigators their share in the advancement of electro-therapeutics. This must be settled by the cooler judgment which is possible only to those who come later. Some whose names are now prominent may then be passed over with a bare mention, while others whom we have scarcely heard of may be heralded as those who have marked out the true road for advancement.

Chicago Electro-Medical Society.

The regular meeting of this society was held May 30th, 1903. After the routine business the following paper was presented:

X-Ray and Its Adjunct Treatment.

BY H. PRESTON PRATT, M. D.

The subject assigned to me for this paper, "X-Ray Therapeutics," has been written upon and discussed so often in medical societies by essayists who were more or less familiar with the subject that a majority of the physicians have lost interest in it before they have fully realized its value. The field of its usefulness is so extensive that it would be impossible for me to do the whole subject justice in this short paper; and as there are other methods which can be used advantageously as adjuncts, and which are in some cases superior to the ray treatment, with your kind permission I will discuss the following subject: "X-Ray and Its Adjunct Treatment vs. The Knife."

The question of the treatment of deep malignant growths, such as cancer of the cervix and adjacent tissues, or of the rectum, by electricity, is one of the most difficult problems the electro-surgeon has to consider, especially when so little is known of their etiology and pathology. We depend entirely upon the clinical data to direct our treatment. In a paper read by Dr. A. F. Jonas, of Omaha, before the meeting of the American Medical Association at New Orleans last month, on cancer and immunities, he says, as a result of his review of the etiology of cancer, that the cancer question must be solved along chemical lines. "We are well aware that the infection energy does not depend on the bacteria themselves, but on their products, which are purely chemical." If Jonas' reasoning proves to be correct then our field of research must be directed along electrical lines; whether in the form of x-ray, electrolysis, or sterilization by kataphoresis, we cannot say. So far as the knife is concerned, the mortality has not been materially lessened by it, and consequently to follow further in the purely surgical direction would be unwise.

Now let us turn to the x-ray, which is a form of electrical energy, to see what has been accomplished. In a comparatively short space of time almost all kinds of superficial malignancy, when taken in time, have succumbed to x-ray treatment. As to deep-seated malignancy, it is still a great and unsolved question. Why have we been successful in treating superficial and not deep malignancy with the ray? There are two or more reasons: First, that the deeper growths do not receive as great an amount of x-ray energy from the tube as the superficial ones do. This is simply a question of physics. The difference is in the intensity of the x-ray effecting ionization, as Dr. T. Proctor Hall so ably expresses it in an article read before the American Roentgen Ray Society, held in Chicago last December, and published in THE AMERICAN X-RAY JOURNAL of February, on X-Ray Physics. "The intensity of x-rays from a given tube, or, if you please, the number of rays per square centimeter, varies inversely as the square of the distance from its center; following the same law as gravitation, light, sound and all other radiating forces. In determining the effects of a given tube at varying distances a mathematical calculation in accordance with this law is necessary. For example, at one foot from the center of the tube the rays are four times as powerful as at a distance of two feet from the center, nine times as strong as at a dis-

tance of three feet, sixteen times as strong as at a distance of four feet." So you see it is necessary to have a much more powerful electric generator, and larger and better tubes built to stand more current, in order to obtain the intensity required to reach the deeper tissues. We are dependent entirely upon the number of lines of force projecting from the tube to bring about ionization of the tissues. Ionization means changes of the elementary structures, increase in metabolism. We desire the greatest possible number of these lines of force within a given space for our best therapeutic work and this is only possible with a low or soft tube. Each electrical change in a line of polarized atoms dissociates a definite number of elements composing the tissue, and this dissociation and reassociation of the freed ions decomposes and destroys the cancer cell. The protozoon of cancer is practically identical in composition with the tissues of the human body.

Almost all pathologists believe that cancers are of epithelial origin. There are many opinions expressed as to the causation of cancer. It is immaterial, so far as the treatment is concerned, whether its origin is from a parasite, or is due to parasitic misplaced cells, or to bacteria. All clinical evidence would class it along with infectious diseases. I am of the opinion that the difference between a malignant and non-malignant cell is in the composition of the cell, in other words, the non-malignant cell has been converted into a malignant cell by an increased or decreased number of elements added to or subtracted from the normal cell, or by the rearrangement of the elementary structure of the cell itself in relation to the adjacent cells. These changes may be produced by a parasite or be due to bacteria feeding on the cell, which may bring about a change in the nerve supply.

In treating superficial growths with the x-ray, including carinoma of the breast as well as some forms of sarcoma, the distance of the tube from the growth varies from half an inch to fifteen inches. The closer the surface of the tube is to the growth the greater is the intensity of the ray, the greater its destructive influence, and consequently the greater the physio-chemical change in the tissue. There are no two cases that can be treated alike. The reasons are obvious; their susceptibility to electrical influence varies. One patient may be treated several weeks with a low tube two or three inches away without even reddening the skin, while another reddens under the same conditions after one or two treatments; and others would receive a severe burn at fifteen inches distance from the tube during the same period. To protect the parts I am using a protecting screen, with celluloid interposed between the tube and the patient to prevent microbes and other impurities from being driven into the body, which is the cause of so many septic burns.

In treating with the x-ray superficial growths we have a great mass of clinical evidence from which to make a satisfactory deduction as to its limitation; not so with the deep growths in the cervix, rectum, etc. This is due to the lack, as I said before, of stronger appliances. The technique, as far as principle goes, would be the same in all cases, provided the tube were suitably constructed for each individual case. We find it very difficult to treat successfully carcinoma of the cervix and rectum with the ordinary x-ray tube. We have been compelled to design specially formed tubes to conform to the part being treated. The object is to bring the tube as close to the part as possible, thereby increasing the intensity of the ray in the tissues. A method that I have adopted and used for several years in treating cervical cancer, especially when the vaginal walls are involved, is to increase the force of the machine as much as possible, using a low tube, and if I find

that it is impossible to get the desired results, then I use a specially made tube and pass it in thru the orifices, using a celluloid speculum so that the tube itself does not come in contact with the tissues. To treat the cervix, vaginal wall and rectum successfully it is necessary to get the tube as close to the parts as possible, hence the necessity for specially designed tubes for the orifices of the body. The tube itself should not come in contact with the tissues of the body, but should be within a celluloid speculum. The parts should be thoroly cleansed with a mild antiseptic before and after treatment, which should be followed by an antiseptic tampon.

The reason why there has been so many failures in the use of the x-ray is because the operators' experience has been limited and they have not known when to continue or stop raying. They did not realize that the ray threw into the circulation effete matter in large quantities, sometimes in larger quantities than lymphatics could handle. The patient succumbed to autotoxemia, not due directly to the carcinomatus infection but to the effect of the ray overloading the lymphatics. When a treatment is commenced with the x-ray it should be followed up until a final cure results. Otherwise it is not advisable to use the ray at all. Unless the treatment is followed up it certainly will make conditions worse.

It is sometimes advisable in treating carcinoma of the cervix and rectum to destroy the growth under an anesthetic by electrolysis. Another excellent treatment is the one first suggested by Dr. Massey, in which he destroys the growth thru electrolysis by kataphoresis sterilizing the surrounding tissues. He uses amalgamated zinc for the positive electrode, and from a half to an ampere and a half of current.

Dr. Massey's treatment is certainly good, but is not ideal. I am experimenting on a modification of his treatment. I have been able in several cases to sterilize the tissue successfully with a weak current without a destructive process. I am of the opinion that the coming method for treating malignancy is in the use of electricity in some form, and as an adjunct treatment the use of a sterilizing solution which will be readily decomposed and can be injected into the tumor and dissipated thru katophoresis or given internally. This sterilizing solution is just as liable to be in the form of an animal extract as in the form Dr. Massey uses.

The next meeting of the Chicago Electro-Medical Society will be the annual dinner, which will be held at the Albion Cafe, Pullman building, Monday, June 29, next, at 6.00 p. m. promptly. The city electrician, Edward B. Elliott, will read a paper on the effects of electrolysis upon the public health. Several eminent scientific investigators will take part in the discussion. The Society does not meet during July and August.

Radio-Activity Produced by Light.—Le Bon (*Comptes Rendus*, July 7; abstracted in Lond. *Elec.*, July 25) gives an account of experiments in which he studied the effects of light of different wavelengths upon all kinds of material bodies. He found that practically every kind of matter may be made to emit Becquerel rays by the action of light alone. If a body is exposed to sunlight, or, still better, to ultra-violet light, it gives off a form of radiation which is capable of discharging a positively charged electroscope. Amalgamated tin, copper or zinc show the strongest effect, black paper and lampblack are almost as good. Living matter shows least of all.—*Electrical World and Engineer*, August 30, 1902.

The Use of the X-Ray Picture as Evidence of Internal Conditions.

The x-ray is rapidly becoming an important factor in medical science. Its value as a means of diagnosis is well settled and its usefulness in the treatment of certain diseases is recognized, tho in the latter particular its properties are yet more or less a matter of doubt. It has shown its value beyond dispute in determining internal conditions of the human body, such as the extent of a fracture, the location of a bullet and deformities of the inner body, and it becomes important from a legal point of view to know what value as evidence a picture showing such internal condition has.

The word "evidence" includes all the means by which any alleged matter of fact, the truth of which is submitted to investigation, is established or disproved. The true question is not whether there is sufficient probability of its truth; that is, whether the facts are shown by competent or appropriate and satisfactory or sufficient evidence. If they are established by such evidence, they are said to be proved. What is satisfactory and competent evidence depends in each case upon the subject matter involved, with the underlying principle that nothing is competent and sufficient which does not refer to or grow out of that subject matter.

A witness's testimony, being an attempt to communicate to the court or jury the knowledge possessed by the witness, will usually employ the ordinary mode of expression—that of oral utterance in the language customary in judicial proceedings in the locality. But there are other modes of communication, and the need for resorting to them often arises. As to one and all of them, it is true that whatever mode of communication is employed presupposes a qualified witness as its testimonial support and cannot of itself have any standing independently of that witness whose knowledge it serves to represent. Examples of this class are maps, models and photographs, none of which are receivable in evidence of themselves, but must enter as representing some witness's testimony in graphic form.

The x-ray picture is a photograph, and what is true of the photograph as generally understood should be true of the x-ray picture. So far as concerns the accuracy of the photographic process, it would be a mistake to credit it with a necessary correctness independent of human control, notwithstanding the supreme court of Georgia said in an old case that the sun was "a truthful and impartial witness." The conditions of the process can be so manipulated that the photograph is as false as the falsest witness; such as illustrated in articles in the *Strand Magazine* for February, 1895, and for May, June and July, 1898. But this is no reason for excluding the testimonial use of the photograph. It stands precisely on the same footing as the map or model. It is legitimate as a mode of communicating testimony in appropriate instances and it may be most helpful, but it equally requires and rests upon the credit of some witness.

The ordinary photograph is everywhere recognized as a permissible mode of testimony where appropriate. It has been received in proof of land, buildings, human beings, and particular parts of the body when verified by some one, not necessarily the photographer, who has knowledge of the object represented and can testify that the photograph represents his idea of the object.

The x-ray photograph is taken of unexposed parts—parts that nothing else than an operation would expose—and the re-

quirement that the witness verifying it must have knowledge of the object represented and that the photograph represents his idea of the object, cannot be fulfilled. The witness may have an idea of the probable condition of the parts photographed, but he cannot in most cases say that the photograph represents that condition as he saw it. He must be the one who took and developed the plate, or was a witness at the exposure and developing of the same, to be of the most value, for, unless he knew the plate and the print from it to be the result of the exposure of the particular subject to the x-rays, his testimony would be useless. By looking at the picture a witness would not be qualified to verify its truthful representation unless he saw it taken and could identify it as the one taken. Here is where the admissibility of ordinary photographs differs from the admissibility of the x-ray photograph. Any one familiar with the subject matter of the ordinary photograph can testify as to the truthfulness of the picture, no matter if he never saw the picture before; while with the x-ray photograph, no one ever saw the subject matter and the witnesses can only say that they took it or saw it taken and that it probably represents the condition of things. The opponents would hardly be in a position to contradict the testimony, for they could not produce the best evidence—the actual parts themselves. So that the x-ray photograph stands upon a peculiar footing. It is the best evidence attainable in the absence of an operation, and if it could be shown by the evidence of competent witnesses that it truly represents the object it is claimed to represent, its value is inestimable.

The acknowledged importance of this photograph in assisting proper diagnosis, and the many successful results based on x-ray diagnosis, has broadened the field of admissible photographs under the general rule we have been discussing. The courts now are leaning toward its admission in suitable cases, and it is rightly so; for in most cases where the x-ray photograph is used there is not better evidence obtainable, and it would be an abuse of discretion on the part of the court to deny its admission. The discretion of the trial judge is not absolute in this respect and may not be arbitrarily exercised. The recent case of Carlson vs. Benton, decided by the supreme court of Nebraska, is the latest authority on this subject. It establishes the rule that where the evidence as to the accuracy of the photograph leaves no room for a difference of opinion, it is wrong to exclude it on the ground that a sufficient foundation has not been laid—that is, that it was taken by a competent person; that the condition of the apparatus with which it was taken and the circumstances under which it was taken were such as to insure an accurate picture, and that competent witnesses can show that it truly represents the object it is claimed to represent. The courts in prior cases in the states of Nebraska, Washington, Ohio, Massachusetts and Wisconsin have admitted these pictures in evidence, and each one did so on the ground that no better evidence was available and that the pictures were properly explained and authenticated.

It is, therefore, certain that the radiograph has received the approbation of the law as a means of conveying information to the court or jury of conditions otherwise unascertainable. "New as this process is," says the Tennessee supreme court in Bruce vs. Beall, "experiments made by scientific men, as shown by this record, have demonstrated its power to reveal to the natural eye the entire structure of the human body, and that its various parts can be photographed as its exterior surface has been and now is. And no sound reason was assigned at the bar why a civil court should not avail itself of this invention, when it was apparent that it

would serve to throw light on the matter in controversy." Every surgeon can well afford to protect himself in all doubtful cases by the use of the rays and thus save himself from what may prove to be a serious difficulty. The use of the x-ray is still in its infancy, but it is widening out rapidly. The law will keep abreast of this advancement and expand with it, and we will soon have a highly valuable piece of documentary evidence which will carry conviction with it and make it of great value in the damage suit against the physician and surgeon for malpractice.—*Medico-Legal Bulletin.*

Ultra-Violet Rays.

The method employed by Finsen, Lortet-Genoud, Bang, Görl and others, to utilize the violet rays, have induced lamp-makers to put upon the market a lamp that is economical yet powerful. The original lamp devised by Finsen is so expensive that but few hospitals and clinics have been able to buy and maintain them. Very naturally some ingenious and inexpensive machines have made their appearance, warranted and guaranteed to produce the desired rays at a nominal expense.

Dr. Henry G. Piffard, of New York, has devised a simple modification of the Görl lamp, and it is now manufactured by the Waite and Bartlett Mfg. Co. It has three spark-gaps protected by a quartz surface. It is compact, and readily attached to a static machine. It is convenient to use, and causes no annoyance to the patient.

The ultra-violet rays differ from the x-rays in their effects. They are supposed to be etheric vibrations with short wave-lengths. They can be reflected, refracted, and polarized; they will not traverse many bodies that are perfectly pervious to luminous rays, e. g., glass; they will not influence deep or superficial tissues unless dehematized; they may be stopped by a sheet of paper; they will rapidly destroy the vitality of bacteria; they will excite bright-green fluorescence in Willemite, and will traverse rock-salt and quartz. These latter tests will demonstrate the presence of the ultra-violet rays, otherwise they are invisible. Hence lamps that will not show the presence of these rays by these simple tests are not suitable instruments. A number of inferior lamps are advertised, made, perhaps, with violet globes and are called violet-ray lamps, but their therapeutic value is worthless.

The use of the ultra-violet rays is limited. So far they have demonstrated their efficacy in lupus and other bacterial skin diseases. The lamps are comparatively new, and only after an extended application to skin lesions can their value be ascertained.

A large number of instruments for light treatment have been manufactured that give results by concentration of the rays from the sun and from arc lights. Evidently they do some good by the concentration of rays on the diseased surface, —a burning, scorching or drying of the lesion. Such instruments are widely advertised to cure many diseases. They claim to produce all sorts of rays—actinic, blue, violet and ultra-violet. Their value lies only in their power of concentration; the results are tentative.

The light treatment like all other new forms of therapy will probably be enthusiastically overdone, and after a time will be tested by scientists for its true worth. The charlatan will reap a rich harvest with these imposing appliances, and the people will be experimented upon and victimized to their limit of endurance, and the depth of their purses.—*Northwestern Lancet.*

EDITORIAL

The Source of the Radiations from Radium.

The radiations from uranium, radium, etc., are in part a discharge of negative electrons, being similar in this respect to the kathode rays, and in part rays similar to x-rays. These radiations are found to be capable of giving out a continuous stream of energy, for when completely surrounded by ice so that apparently no energy can reach it from without, the ice in its immediate neighborhood is melted at the rate of an amount equal to its own weight in two hours. Here, then, is an apparently inexhaustible supply of energy. Prof. J. J. Thomson explains the source of this energy on the basis of the electron theory on the assumption of an explosion of the individual atoms of the radium, which he assumes to be unstable when their velocity greatly exceeds that of the average atom. While this explanation is undoubtedly ingenious and is something so new that it gives the average reader a sort of shock as tho some of his most firmly fixed ideas of atoms were being overthrown, it is not, as some have supposed, an attack upon the principle of the conservation of energy. Prof. Thomson calculates that there may possibly be enough of this explosive energy in the atoms of a piece of radium to enable it to keep on melting ice at the rate given above for 30,000 years. Without in any way opposing this ingenious theory we may point out that there is no real necessity for it in order to explain the source of this energy. Every scientist knows that there are innumerable ether waves, variously known as light and radiant heat, constantly passing in every direction, to many of which ice is transparent. It is only necessary to suppose that some of these radiations are transformed into heat by the radium; in other words that the radium is opaque to a considerable number of these ether waves to which ice is transparent; in order to have at hand a full explanation of the source of the radiant energy of the radium. A parallel case is seen in the melting of ice around a dark colored body in its interior under the influence of sun light.

Rays from the Living Human Body.

Prof. A. W. Goodspeed, of the University of Pennsylvania, is credited by the daily press with the discovery that under the action of x-rays the human body gives out radiations of sufficient power to affect the photographic plate. This effect of the x-ray, namely, its dispersion or irregular reflection from the human body as well as from other objects, was pointed out by Prof. Roentgen in one of his original communications, and attention has been called to it from time to time ever since. It is to be hoped that Prof. Goodspeed's experiments will be such as will throw more light upon this interesting characteristic of x-rays.

The Price of Radium.

The daily papers report with apparent satisfaction that radium has been reduced in price from $1,000,000 to $900,000 a pound. The total amount in the world in commercial form is about two pounds, so that those who desire to invest should send in their orders early.

Electro-Physics.

Excited Radio-Activity.— Rutherford (*Phil. Mag.*, January) contributes an article in which he shows that the production of excited radio-activity is one of the properties of the emanation from thorium and radium. It is due to the deposition of radio-active matter which is derived from the emanation given out by these bodies. Excited radio-activity is transmitted by positively charged carrier produced from the emanation, which travel in an electric field with about the same velocity as the positive ions produced in air by Roentgen rays. This velocity is about 1.3 cm per second for a drop of 1 volt per cm. These positively charged carriers are due to the expulsion of a negatively charged body from the mole cule of the emanation. The emanations and the matter which gives rise to excited activity are the result of a succession of chemical changes occurring in radio-active matter. In thorium there is evidence of at least four distinct chemical changes.—*Electrical World and Engineer*, February 7, 1903.

Radioactivity of Uranium.—Rutherford and Soddy.—A paper in which they discuss the radioactivity of uranium, as compared with thorium. The case of uranium presents some interesting features and is in some respects simpler than that of thorium. They make an important distinction between the photographic and electric effects. The uranium radiation consists of two types: First, the easily absorbed rays; second, the penetrating rays which are readily deviable in a magnetic field. The former constitute by far the greater part of the electric effect, the latter practically all the photographic effect. The case of uranium is especially interesting on account of two points: First, the existence of non-separable activity consisting entirely of easily absorbed rays, as in the case of thorium; second, the non-existence of easily absorbed rays in the radiation of "uranium X." This is probably an example of a general law that when gotten by itself free from the matter which produced it, on the one hand, and the products of its further change, on the other, each type gives rise to homogeneous rays, and that in all cases the easily absorbed rays are produced first and the magnetically deviable and penetrating rays only result in the final stages of the disintegration. Uranium gives more definite evidence on this point than thorium.—*Phil. Mag.*, April, 1903.

Nature of Roentgen Rays.—Rayleigh.—An editorial note on an opinion expressed by him concerning the nature of Roentgen rays in a recent lecture on light. If Blondlot's recent observations can be accepted as perfectly reliable, whereby he found that they are polarized as usually obtained and that the plane of polarization can be rotated, then little doubt can be felt that they are really ordinary light of extremely short wave length, as was surmised by Stokes and J. J. Thomson several years ago. The wave length must be very short to yield such slight effects as have, up to the present, been observed. Of course, Blondlot's results must, till they are confirmed by other observers, be accepted with some reserve.—*Lond. Elec.*, March 27.

New Inventions.

It is claimed that Cooper Hewitt has devised a lamp which gives a pure steady light seven times brighter and cheaper than the incandescent light now in use. He has also designed a mercury vapor interrupter which is said to be far superior to those now in use.

Roentgen Rays and Others.—A recent discovery which is of very great interest seems so far to have attracted less than its due share of attention. We refer to the discovery by M. Blondlot of an entirely new set of radiations derived from an ordinary focus tube and capable of penetrating thin wood, paper, aluminum foil and the like. The striking feature of the newcomers is the fact that while possessing a fair amount of penetrative power they are unmistakably to be classified with ordinary light, and yet do not affect the photographic plate. They can, however, be reflected and refracted, are in themselves plane polarized, but can be given elliptic polarization or rotary polarization by the usual means, and can be brought to a focus by a lens and be deviated by a prism. M. Blondlot, using a tiny spark for an indicator, demonstrated all these properties and finally obtained a rough measure of the index of refraction through a quartz prism. It proved to be in the neighborhood of 2.0, although the radiation evidently covered quite a range of refrangibility. This would indicate that the Blondlot rays, as they deserve to be called, are allied to the extreme ultra-violet rays of the known spectrum. Ordinary metallic spectra rarely show anything beyond a wave length of about 200 bikrons. By putting source and apparatus in vacuo, wave lengths down to about 100 bikrons have been found by photography, but beyond this atmospheric absorption or failure of the photographic plates has blocked further progress. Now from the index of refraction observed Blondlot's rays are likely to be very much shorter in wave length even than 100 bikrons, so that at first glance the discovery would look as if we had passed beyond a great atmospheric absorption band and reached a new region one step nearer to the debatable ground held by other mysterious radiations. Each year we are getting material for the study of generalized radiation in place of our previous fragmentary knowledge, and sooner or later the time will be ripe for a general clearing up of the subject. Just now we are fumbling around rather in the dark and making very hard work of things that will probably turn out to be simple.—*Electrical World and Eng.*

Intensity and Wave length of Roentgen Rays.—HOLTSMARK.—An account of experiments in which he utilizes the secondary rays produced by the impact of Roentgen rays in order to measure the intensity of the latter. This is necessary on account of the uncertainty which attaches to their measurement by means of the photometric and ionization methods. A plate of lead or platinum is enclosed in an aluminum box and exposed to x-rays. The secondary rays produce a negative charge on the aluminum and a positive charge on the lead or platinum. On connecting the latter with the earth, a continuous current may be observed and measured; this current is directly proportional to the intensity of the Roentgen rays. The author has used this method for the measurement of the absorption of x-rays by various metals. Taking the values obtained, and using Helmholtz's theory of dispersion, he shows that the wave length of a radiation is proportional to the square root of the coefficient of absorption. In Roentgen rays, the refractive index equals unity, as it should if the frequency is about the same as the frequency of vibration of the electrons or greater than that. The values for the wave length vary according to the metal used for absorption. The highest value is 51.8 millimicrons, obtained from gold, and the lowest 2.4 milli-microns, obtained from steel and zinc.—*Ann. d. Phys., No. 3; abstracted in Lond. Elec.,* March 20.

Electric Photography.—The subjoined cablegram from London of May 12 may refer to something very old or very new: John H. Heaton, M. P., who has returned from Italy, whither he accompanied Signor Marconi, says he saw at an observatory near Rome specimens of a new system of electric photography, by which clear pictures can be obtained of persons and scenes twenty miles distant. He thinks it conceivable that the system can be developed so as to enable the making of photographs of friends in distant lands while conversing with them by wireless telegraphy.—*Electrical World and Eng.*

Electrons and Ions.—Reinganum, in an article on the mechanism of electrochemistry [*Ann. d. Phys.*, No. 2; abstracted in Lond. *Elec.*, February 13] attempts to formulate a theory of the distribution of the electrons in the molecules entering into electrochemical reactions. He assumes that each molecule, say of H Cl, contains two pairs of electrons, the H atom being provided with one pair and the Cl atom with another pair. Electrolytic "dissociation" might then be represented by the giving off of one negative electron from the H atom to the Cl atom, so that the H atom has now one positive electron, while the Cl ion has one positive electron and two negatine electrons, and thus is negatively charged. When Cl is set free at the anode, each Cl ion gives off one negative electron and thus becomes neutral, having one positive and one negative electron; similarly with the H at the cathode. Through the external connection the negative electrons pass from the anode to the cathode, thus completing the circuit. The author works out this idea for the different compounds and shows why the dissociation constant is a measure of chemical affinity. It is probable that the transfer of the supernumerary electron is accomplished even before actual electrolysis takes place.—*Electrical World and Engineer*, March 14, 1903.

Magnetic and Electric Deflection of Kathode Rays.—Starke, (*Ber. Deutsch. Phys. Ges.*, No. 1, 1903) gives an account of an investigation of the reasons of the change of kathode rays due to reflection and transmission. It was formerly supposed that kathode rays suffer no change by reflection and transmission except in direction; but Gehrke and Leithaeuser have shown that a reflected or transmitted kathode beam is heterogeneous, and will be drawn out into a sheaf by an electric or magnetic field, altho the same field is quite powerless to split the beam before reflection or transmission. On the electron theory, it might be supposed that it is either the ratio of charge to apparent mass of the kathode rays that is altered, or their velocity. The present author has made some experiments to test which of these alternatives is true; and finds that the latter is correct, as the ratio of charge to mass is unaltered, while both reflections and transmissions have the effect of considerably reducing the velocity of some of the kathode rays.—*Electrical World and Engineer*, Feb. 28, 1903.

Unipolar Currents. — Christiansen (*Ann. d. Phys.*, No. 8) has a paper on a peculiar apparent departure from Ohm's law, observed in certain electrolytes. He applies the term unipolar current to the current thru mercurous nitrate in nitric acid, with mercury electrodes, because this current greatly depends upon the size of the kathode, and not on the size of the anode. The irregularity observed is that under certain conditions the current is independent of the e. m. f. It varies, however, directly as the surface of the kathode and as the percentage of mercurous nitrate.—*Electrical World and Engineer*, Sept. 13, 1902.

Light and Kathode Rays.—Zehnder (*Ber. Deutsch. Phys. Ges.*, No. 1, 1903; gives a description of some new effects of kathode rays and light rays. Many salts are known to be colored under the influence of kathode rays, and to lose their color subsequently when exposed to light. The author has found that if an object is traced on a dry plate by means of kathode rays and the plate is subsequently exposed to the light, it may happen that after development the portion illuminated by the kathode rays appears brighter than the rest, thus recalling the effects of solarization. "Celloidine" paper, once exposed to kathode rays, becomes less sensitive to the effects of light. If the paper is then exposed to diffuse white light, that portion becomes darker which was not previously exposed to the kathode rays. It is thus possible to obtain a negative of a positive image produced by kathode rays. Solio and other papers show similar effects. A circular patch exposed first to kathode rays and then to light, first becomes paler at the margin, where the kathode rays were presumably less active, and gradually the brightening extends to the center. A fixing bath bleaches the kathode-exposed portions much quicker than the light-exposed ones. Magnetically-deflected kathode rays have the same effect as ordinary ones.—*Electrical World and Engineer*, February 28, 1903.

Absorption of Electric Waves by Gases.—Lecher (*Phys. Zeit.*, October 10) gives a description of an experiment which proves that the rings in an exhausted glass tube, produced by J. J. Thomson in an alternating electric field, are not due to electrostatic charge, but to an absorption of electric waves by the gas. The present author winds a bifilar wire coil and a simple wire coil round the same tube, and sends strong electric oscillations through both. In spite of the high charge of the wire in both cases, a ring is only formed inside the simple coil. He describes a method of studying the electrical conductivity of gases by observing the luminous phenomena thus produced. It consists practically of a vessel resembling a Bunsen ice calorimeter, the secondary coil being placed in the interior and the primary coin outside, with the gas or electrolyte in question filling the space between them. He finds that at a pressure of about 0.1 mm the air conducts much better than the best electrolytes. Such a pressure exists at a height of about 40 miles in the atmosphere, and it is therefore evident that the upper atmosphere very likely absorbs long Hertzian oscillations coming from the sun. It also explains the electric discharges often accompanying the fall of meteorites.—*Electrical World and Engineer*, Dec. 13, 1902.

Ionization of Salt Vapor.—Moreau (*Comptes Rendus*, November 24) gives an account of some experiments made to elucidate the mechanism of flame conduction. He introduced two small platinum condensers into a flame, gave a high charge to the lower one, and observed the conduction across to the upper one. He found that this conduction was independent of the charge of the lower one, and hence concludes that the flame contains no free ions, since these would be absorbed by the lower condenser. In another experiment he mounts a salted flame between and in contact with two unsalted flames, in one of which an electrode is fixed. A movable electrode plunges into the other flames, and as soon as it touches the salted flame the conductivity goes up abruptly, to a great extent if the electrode is negative, and to a small extent if it is positive. This unipolar conductivity is analogous to that of a mass of hydrogen surrounding a carbon filament. The author believes that the presence of a metallic conductor is essential for ionizing a vapor.

Electro-Diagnosis.

Fracture of the Radius.—Journal of American Medical Association, Dec. 6, contains an article on this subject by Dr. Carl Beck, of New York, in which the author claims that X-Ray examinations have shown in Colles' fracture that with the upward displacement is generally associated a lateral displacement, as a rule in the outward direction. He has (as have others) observed a number of cases in which the lower fragment has turned backward on the sagittal axis which itself has turned round. The oblique type in which the joint surface is split was not recognized before the Roentgen era. Beck reduces the fracture thus: The hand of the patient is grasped as in a firm handshaking by the surgeon's left, while the thumb is held by the surgeon's right hand so that the thumb of the latter presses the fragment downward while his index finger presses it inward at the same time. Counter extension must be made at the elbow. In multiple fractures, even the Y-shaped variety, the articular arch of the radius may sometimes be restored by repeated efforts of reposition controlled and corrected by the x-rays. If this proves impossible, speedy osteotomy must be resorted to. He applies a plaster-of-paris dressing immediately after reduction. This embraces the thumb if the displacement is upward, or upward and outward. The direction of the thumb influences that of the fragment. If pressure of the index finger does not keep the fragment down; it must be pressed down with a stick. When this is bandaged down, the fluoroscope shows whether or not the fragment is in position. A dorsopalmar and lateral examination must always be made. In the T or Y-shaped variety the outwardly displaced fragment is pressed inward by a pad of adhesive plaster. The fragment, toward the ulna, after being shifted into place, is prevented from slipping back by rubber tubing between it and the ulna on the dorsal aspect. The circular plaster dressing in abduction is indicated. He declares we must not depend on palpation alone. Early massage for removal of extravasation is indicated in intra-articular fractures and contra-indicated when there are chips.—*Am. Jour. Surg. and Gynecology.* March, 1903.

The Roentgen Ray, Its Mechanics, Physics, Physiology and Pathology.

Dr. Edwin E. Delphy, in the *Medical News,* April 18, 1903, attempts a summary of our knowledge of x-rays. For their production either a static machine having 10 or more revolving plates or a Rhumkorff coil giving a spark six inches or more in length is satisfactory. The interrupters are the strong or vibrating, which is satisfactory for low tension currents; the slate wheel having on it segments of copper; the mercury interrupters; combinations of these; the thermo-electrolytic of Caldwell, and the Wehnelt or pure electrolytic. The structure of the tube and the modes of raising and lowering the vacuum are described. He points out that the actinometer measures the penetration of the ray but not its quantity (intensity). The latter may be measured by Bugnet's X-ometer, which measures the fluoroscopic effect, or by the chromo-radiometer of Holzknecht, which depends upon the photographic effect of the rays in a given time. Dr. Delphy considers the Becquerel rays to be ether waves much shorter than the waves of ultra-violet light, and the x-rays to be electrical oscillations of still briefer period. He describes the well known chemical and physical properties of the x-rays and of the kathode rays. S-rays is the

name given by some to rays which are produced when the x-rays strike some resistance, and the name S′ or Goldstein rays is given by some to the x-rays that have passed thru some transradiant medium. The physiological and pathological effects are briefly considered by the author who quotes the opinion of others on these subjects.

Roentgen Rays in Cranial and Cerebral Affections.—Benedikt calls the attention of the profession to the information to be derived from radiographs of the skull after traumatisms causing the so-called "shock neuroses." He takes radiographs of the profile and also of the front and back of the head, and finds that in many instances the bones are abnormally permeable for the rays at the points where pressure is painful, showing the existence of some inflammatory process at this spot. The facts demonstrated by radiography have been confirmed by the anatomic findings later in many cases in his own and Kienboeck's experience. In case of pachymeningitis, the inner layer of the bones of the skull may be less permeable than normal. This corresponds to the hemorrhagic tendency of pachymeningitis. In cases of unilateral meningitic swelling or hydrocephalus externus, the increased permeability will attract attention while pachymeningitic hemorrhages are distinguished by the reverse phenomenon. These shades of difference are best seen on the plate, and physicians should learn to read the plates and thus avoid the further errors of the copy. Roentgen rays thus applied avoid all confusion from simulation or aggravation on the part of the subject, and reveal the anatomic basis for traumatic neuroses which is too often denied.—*Jour. A. M. A.*

X-Ray in Medical Diagnosis.

Dr. S. P. Rees, of Minneapolis, writes an excellent paper on this subject in the *Northwestern Lancet*, May 1, 1903. After calling attention to the value of the rays in surgery, to the necessary apparatus, and to the methods of examination by the fluoroscope, he refers to the importance of correct interpretation of x-ray pictures. In one case the maker of a skiagraph showed a large round mass which he interpreted as a stone in the bladder, but which really was produced by a round ring pessary. Only a physician can make true interpretations from skiagraphs. The chest conditions in which x-ray examinations are useful are given in detail. His conclusions are that the x-ray is a very valuable aid in the diagnosis of many medical diseases, and of primary importance in the diagnosis of several, that under proper conditions the danger of x-ray burn is very small, and that the rapid improvement now being made in apparatus and technique render it difficult for the ordinary practitioner to at present make much use of this method of examination.

Stereoscope for Roentgen Ray Photographs.—An illustrated article in which attention is called to the fact that stereoscopic Roentgen ray photographs, produced by using two focus tubes, or by using a single tube in two successive positions, are always too large for use in the ordinary hand stereoscope. A direct-vision spectroscope devised by Walter is described which is capable of viewing photographs of any size, consisting of a combination of a wide-angle photographic camera and two simple eye pieces; for these latter lenses of the ordinary hand stereoscope may be used. In Walter's spectroscope there are neither reflectors nor prisms, but only lenses. The construction is described and illustrated in detail.—*Elec. Rev.*, April 24.

Electro-Therapy.

Electric Production of Sleep.—LEDUC [*Comptes Rendus*, July, 21; abstracted in Lond. *Elec.*, August 15] gives a description of a method of producing sleep and local anaesthesia by means of electric currents. Continuous current is used, from an accumulator, with a small resistance in the circuit. A non-inductive interrupter, giving 150 to 200 breaks per second, is inserted in the circuit. A moist electrode is placed on the animal's shaven head and another on the back near the tail. The e. m. f. is rapidly increased till the animal shows generalized contraction, and respiration is stopped. The current is then reduced to about 5 milliamperes, with 12 to 30 volts. Respiration then sets in again and the animal sleeps a profound and tranquil sleep. It lasts as long as the current is continued. "As soon as it stops, the animal wakes up and jumps about with every sign of delight, and no evil consequences appear to result." If the current is not first brought to the point at which respiration stops, some agitation is displayed, such as seen in the administration of chloroform. A similar current applied to the root of a human nerve, such as the median of the wrist, gives rise to complete anaesthesia of the region innervated, accompanied by a prickling sensation, which is not painful. *Electrical World and Engineer*. Sept. 13, 1902.

Kataphoric Medication.

Dr. J. D. Prather, of Oakland, Cal., in a paper published in the *Occidental Medical Times*, March, 1902, discusses kataphoresis on the mistaken theory of the conveyance of a fluid in the direction of the positive electric current. "There is an actual mechanical transference of material from the anode in the direction of the kathode." Such a mechanical transference is unknown to electricians, tho often referred to by writers upon electrotherapeutics. The experiments referred to by the latter to prove the existence of this mechanical transference are inconclusive, and that theory is not accepted by scientific electricians. On the other hand the facts of kataphoresis are all explained upon the hypothesis that it is simply electrolysis. Explanations of kataphoresis based upon "actual mechanical transference of material" fail to explain why the transference is frequently in the wrong direction. Salts of mercury move invariably toward the kathode; that is to say, more accurately, the mercury ions move toward the kathode while the acid ions move in the opposite direction toward the anode. In applying potassium iodid the iodin ions move toward the anode, the potassium ions toward the kathode. Dr. Prather recognizes that electrolysis is the principal element in kataphoresis, and quotes from Hedley the following table for a potential difference of one volt per linear centimeter:

Hydrogen travels at...	1.080 cm. per hour
Potassium travels at...	.205 cm. per hour
Sodium travels at.....	.926 cm. per hour
Lithium travels at.....	.294 cm. per hour
Iodin travels at.....	.216 cm. per hour

He quotes without comment Meissner's conclusions, which we reproduce because they are all wrong:

(1) Kataphoresis will take place from the positive pole only. (2) The electrode liquid must be a better conductor than the liquid within the tissues. (3) The current must be reversed every five minutes. (4) Both electrodes must be moistened with the liquid to be introduced. (5) Both electrodes must be placed as close to each other as possible.

In conclusion he gives a number of cases which have been successfully treated by kataphoresis.

Electrotherapeutics and Quackery.—At the first annual meeting of the British Electrotherapeutic Society, Mr. Edmund Owen delivered an address in which he deplored the lack of proper recognition of the treatment of diseases by electricity, on the part of the medical profession, and attributed to that cause the fact that the medical use of electricity had fallen largely into the hands of quacks. While we cannot agree with Mr. Owen as to cause and effect, our inclination being rather to reverse the order, we heartily concur with him in that the practice of electrical therapeutics is largely in the control of those whose consciences are somewhat blunted and those whose enthusiasm conjures up at times strange dreams. The fact that there are scarcely a handful of reputable authorities in the world to-day who have any faith in or knowledge of the therapeutics of the static form of electrical-manifestation, and that there are hordes of users of this method whose voicings betray their ignorance of even the elements of electrophysics, is significant at least. Turning to so-called galvanic electricity, which has been somewhat explored by able and reputable scholars and put upon a comprehensible basis, we find one recent writer speaking of "a boil that a surgeon had opened, and then the germs got in and the trouble began." He "placed a needle in the boil and turned on about two and one-half milliamperes of *negative electricity*," and the cure was speedy, etc., while others are reporting cures of every ailment from chilblains to cancer, and reporting the same with the most ingenuous disregard for the accepted theories of electricity.

The wide-spread employment of the Röntgen ray will do more to bring about a dissemination, if not a deeply grounded knowledge, of apparatus and electric manifestation and effect upon the human system than anything that has occurred for many years.—Editorial *Medical Record.*

Progress and Promise of Electro-Therapeutics.

Dr. Samuel S. Wallian, of New York, in the *Medical Brief*, March, 1903, says electro-therapy is now for the first time ready to be developed into a satisfactory science which might aptly be called vito-therapy or dynamo-therapy, because life is mainly an electro-chemical phenomenon. He regrets the ignorance of medical electricity among doctors. A rule of thumb is no longer sufficient for the medical uses of electricity. An actual knowledge of electro-physics is required. "Electricity is the primal underlying force of the universe, and therefore no machine generates electricity, but merely diverts it into artificial or universal channels." This statement will hardly meet the approval of physicists. In speaking of the high tension current he points out that many non-conductors such as glass, air, rubber, allow it to pass readily, and consequently the fact that a conductor has a given resistance for a constant current gives little or no information of its power of resistance to high frequency currents. These facts are readily understood when it is remembered that high frequency currents are essentially electric waves.

Electro-Ozonation in Neuralgia.

Dr. G. Lenox Curtis, of New York, in the *Jour. A. M. A.*, August 9, 1902, describes his ozone generator (a high tension current). His process of ozonation appears to be simply the use of the high tension current with vacuum electrodes, which he finds efficacious in the relief of neuralgia of various kinds.

Removal of Tonsils by Electro-Cautery Dissection.

A case of mycosis tonsilaris affecting both tonsils was operated upon by Dr. Richmond McKinney, of Memphis, Tenn., under cocain anesthesia followed by application of adrenalin chlorid, by an electric cautery, resulting in a complete cure. (*Jour. A. M. A.*, April 11, 1903.)

X-Ray Therapy.

X-Rays Cure Xeroderma Pigmentosum.—At the Edinburgh Medico-Chir. Society Dr. Allan Jameson showed a case of xeroderma pigmentosum which had been treated by the x-rays. The patient was a little girl, the youngest of two children, who had suffered from the disease. At the age of 12 months she began to develop freckles at the side of the nose. Later telangiectasis and whitish spots began to develop on the face. The disease had extended to the hands and wrists. When seen on October 1 there was an epitheliomatous growth on the tip of the nose of the size of a sixpence, and numerous warty growths on the face. Thirty-four exposures to the x-rays, each of 5 minutes for the face, and 13 minutes for the right hand, were given. The growth on the nose and all the warts on the face disappeared. An x-ray dermatitis was produced. The nose is now whiter than the rest of the face and there is marked improvement of the right as compared with the left hand. This case shows the difference between the action of the x-rays and the ordinary actinic rays of the spectrum, for the latter tend to increase pigmentation of the skin.—*Jour. A. M. A.*, Feb. 14, 1903.

Treatment of Acne by X-rays.

Dr. R. R. Campbell, of Chicago, reports 15 cases in the *Jour. A. M. A.* for August, 1902, more or less completely cured by the x-rays alone. He used a medium soft tube, moderate illumination about 15 centimeters from the patient, with exposures of ten minutes each, usually every other day.

X-Rays for Hodgkin's Disease.—A case of lymphadenoma treated by x-rays with marked improvement at the University of Colorado Hospital at Boulder suggests the value of further investigations along this line.—*Jour. A. M. A.*

The Therapeutic Use of the X-Ray.

Dr. G. H. Stover, in the *Denver Medical Times*, cites a number of cases successfully treated by x-rays. Ulcers of the leg, cured; cancer at base of bladder, much relieved; cancer of the cervix, improved; epithelioma of face, cured; Hodgkins' disease, much improved. Regarding cost, he says, "I don't know of any operator who has made a cent on his x-ray work so far. Sometimes a tube will last a month; many times one will last 15 minutes or less. The supplying of tubes to a machine reminds me of feeding eggs to an elephant, and if the eggs cost $20 apiece the similarity would be still greater."

Radio-Therapy Observations.

Dr. Joseph Zeisler, of Chicago, in a paper read before the American Dermatological Association at Boston, Sept. 19, 1902, considers the therapeutic effects of exposure to the x-ray tube to be due to the direct action of the rays upon the tissues. The rays from the soft tube give energetic clinical effects, being mostly absorbed in the upper layers of the skin. A good induction coil he considers much preferable to a static machine for dermatological purposes. He uses self regulating tubes of the Müller type. One exposure to the rays for 20 minutes in a single sitting often produces dehiscence of hair from the exposed area. After such treatment wait several days to find intensity of the reaction. He prefers 10 minute exposures at intervals of a day or two to the number of from 5 to 8, after which the further treatment will depend upon the condition of the patient and the amount of reaction present. The accumulative character of the effect must not be overlooked by beginners.

He has never found ulceration or gangrene result from his treatment. This

fact is explained by his use of a soft tube exclusively, which does not penetrate into the deeper tissues. The ideal way of using x-rays is to produce results with the least irritation. He protects the parts which are not to be exposed by thick sheet lead lined with flannel. He gives a summary of the results in 81 cases. In hypertricosis he finds that 3 to 5 20-minute exposures to intense radiation given at intervals of a week or two will produce complete epilation. This results in pigmentation and temporary erythema which gradually yield. He concludes: "I can only say that my experience with radiotherapy so far has made me an ardent advocate of it, and I believe that until it is replaced by something still more marvelous it will constitute one of the most effective weapons in our fight against a large class of dermatologic infections."

Resume of X-Ray Therapeutics.

C. H. STOVER, M. D., DENVER, COLO.

Denver Medical Times, in a very able article on x-ray therapy gives credit to Dr. Pratt as the pioneer in this line of work, as follows:

"The first therapeutic use of the x-ray was made, I am led to believe, by Dr. H. Preston Pratt, of Chicago, who, on April 13, 1896, began the treatment of two patients suffering from cancer of the stomach. These patients claimed to be benefited for the time, but I have no report of the outcome of the cases. On April 19, 1896, Dr. Pratt began a week's treatment of a case of pulmonary and laryngeal tuberculosis; the patient was improved by the treatment, but left the city at the end of a week and later died."

Cancer of the breast is reported cured. One case recurrent, by Ferguson; two cases by Morton, and three by Bryant. In carcinoma an x-ray treatment should follow excision. The x-ray is preferred to excision in superficial cancer of the face. Microscopic study of sections from superficial cancer shows at first a fine granular condition of the cells of the growth, then a loss of the nuclei of the cells, and finally their complete disappearance. He has cured lupus vulgaris, lupus erythematosus and lupus hypertrophicus, by the x-ray; the healing takes place without scarring. Cases of keloid and rodent ulcer are reported cured by x-rays; also indolent leg ulcers, and slow healing and infected wounds. In sarcoma favorable results are reported by Skinner and Morton. Coley favors the conjoined treatment with x-rays and the toxins of erysipelas and bacillus prodigiosus. Allen found it to relieve the pain in chronic rheumatic arthritis, discharging tubercular sinuses, varicose ulcers, and in chronic ulcer of the foot. Hart cured two old sinuses of the abdominal wall after other treatment failed. Soiland speaks of the benficial effects of x-rays in cases of tuberculosis of the lungs; "in 1899 Dr. H. P. Pratt treated three cases of lung tuberculosis, one of them being improved and two apparently cured. [These cases were reported in the Chicago Medical Times in July, 1896.] Of five cases of pulmonary tuberculosis treated at the Royal Infirmary, Edinburg, recently, one has been cured, two were improving, one was not changed, and one, an advanced case, was growing worse; of four laryngeal cases, one was cured, another recovered his voice and was improving, and two had not improved when the report was made. Campbell reports fifteen cases of acne, some inverterate, cured, when other treatment failed. Rebelious cases of acne and indurated eczema, even scrotal eczema, is amenable to the x-ray; other superficial parasitic diseases—sycosis, alopecia areata, and favus are reported cured by x-rays. In the opinion of the writer, the x-ray is the best treatment yet discovered for superficial tubercular diseases, Hodgkin's Disease and epithelioma.

X-Ray Dermatitis.

Dr. Philip M. Jones (*Brooklyn Medical Journal*, April, 1903) says that there is no question whatever in the minds of physicists, tho he believes there is in the minds of some medical men, as to the cause of x-ray dermatitis. It is practicable to eliminate all questions of electrical action, heat action, or conditions of that sort, and to narrow the whole investigation down to the point where the action becomes one of absorption of radiant energy. Having established that point we reach the domain of a very wide field.

The action of energy in chemistry is exceedingly interesting, but very complex. Its characteristic form is in the explosion of high explosives. If, for instance, you hit a cap of fulminating mercury with a hammer, you have a chemical change the result of energy. The molecule in the fulminate is highly complex, composed of a very great many atoms. When it is destroyed the resulting gases take up a wonderfully increased volume, and the result is an explosion.

If we consider the next step we come to the action of light on the photographic plate. Here the action is composed of molecules highly complex in their structure, a large number of atoms that are unstable and easily affected. When the light or any other form of radiant energy that is supplied strikes the emulsion on the plate, we have the same result that may be produced not only by light, but by pressure or electrical discharge. In using a kodak if you twist the roll quickly on a hot day, you frequently find that your film is vague, that there are radiant lines all over the film. It is simply a question of energy in some shape or another being expended on unstable molecules and rearranging the atoms and producing a chemical change. This is exactly what takes place in an x-ray dermatitis.

The x-rays are nothing but radiant energy. They are exactly of the same sort as heat rays or ultra-violet rays or light rays, but they vary in their physical characteristics. If we consider the spectrum, that portion which includes the ultra-violet and light rays we may arbitrarily say represents one-half inch in extent. Then if we skip a blank space of four or five inches, we come to the rays that are known as x-rays; the intermediate rays are undetermined. The longest gap between the x-ray and the rays of the spectrum would represent a reading of four or five inches. The x-rays that we can determine would represent a space of six or seven inches.

The use of these rays of great variety of wave length in medicine is exceedingly interesting. We are just barely scratching the surface. He reported a case in 1897. The patient was a woman of 60 years who had the entire right side of her face one large open sore of lupus, commencing to involve the lower eyelid and involving more than half the right ear. He took this patient to the meeting of the California Academy of Medicine and had her looked over carefully, and told them that he thought theoretically the x-rays should have some effect on these tissues, because the lupus cells are of a decidedly higher organism than the cells in the normal healthy skin tissue. The molecules in the pathological cell are more highly organized than the molecules in the normal cell. The theory on which he based his treatment was, that if this was the case, and if the action in the skin and tissues were similar to the action in the photographic emulsion, then there should be a decided result.

The treatment was commenced and lasted several weeks, at the end of which time almost the entire surface had been healed over with fairly good healthy skin. The ear remained still inflamed and swollen. While he was treating the case he was called away from the city and had to turn the patient over to some one else,

but the treatment was continued with a perfectly satisfactory result. That was sufficient evidence to him that the theory was correct. The theory from a purely physical standpoint is unquestionably correct. At the present time there is no electrician acquainted with the subject that disputes the action of the x-rays in producing this x-ray dermatitis as being similar to the change in the photographic plate.

The further development of this matter of treatment is going to be exceedingly interesting. The variation in wave length is due to two factors: First, the degree of vacuum in the tube, and, second, the rate of interruption in the current thro the tube. The conditions are precisely the same whether we use the coil or static machines. The variation in the rate of interruption of the current going thru the tube can be controlled by a number of physical devices. The question of vacuum is one not readily controlled, and it is an exceedingly vexing question. We can, however, use tubes of different vacuum for different sorts of experiments, and by taking the tube of a given vacuum and changing the rate of interruption, we can produce rays of very great difference in their wave length.

He believes that careful research along these lines will prove that the absorption of the light rays by pathological cells in the deeper tissues is quite possible; in other words, that we will find these pathological cells will be in a certain way selected; that they will be affected by waves of different length, when other cells will not be affected in this way. Certainly it is perfectly possible to make x-ray examinations without producing x-ray dermatitis, if the proper tube is selected and used in the proper manner.

The X-Ray as a Therapeutic Agent.—An interesting discussion upon this subject took place in the Cincinnati Academy of Medicine a short time ago, called forth by a paper by William Jordan Taylor. According to Taylor the x-ray treatment is valuable in the following five conditions: (1) In hypertrichiasis, for the removal of undesirable hair; (2) in diseases of the hair and hair-follicles, such as sycosis, tinea tonsurans, favus, and when the removal of diseased hair is essential; (3) in the treatment of inflammatory troubles, such as chronic eczema, in which it is necessary to stimulate the tissues and produce absorption of inflammatory products; (4) In certain affections in which it is desired to cause destruction or absorption of tissues of low vitality; (5) to relieve pain and to produce sleep. This list, however, by no means exhausts the affections for which the x-rays have been and are employed. In the discussion, which was participated in by Ravogli, Shields and Heidingsfeld, Shields expressed the belief that the results attributed to the x-ray are not due to the action of this agent at all, but to rays of a different sort produced in the tube with the x-ray. He also gave it as his emphatic opinion that the x-ray has absolutely no power to relieve pain. This is in strong contrast with the views of others, particularly with those expressed by Moseley in *American Medicine*, January 31, 1903.—*Am. Medicine*, Feb. 14, 1903.

The Roentgen Ray in Ophthalmic Practice.

Dr. Don M. Campbell, in the *Ophthalmic Record*, July, 1902, illustrates the finding of foreign bodies in and about the eye by means of x-ray photographs, and calls attention to the very great value of this discovery to the ophthalmic surgeon. He mentions also the great value of a powerful electromagnet in removing pieces of iron and steel from the eye.

Laryngeal Cancer.—The actual position of x-ray therapeutics as regards laryngeal cancer at the present time, according to Delavan, is that not a single case has been apparently reported cured, but few cases have been thus treated. In one case treated by Dr. W. J. Morton for the author, apparently good results were produced on the growth, but the patient died of Bright's disease after twenty applications of the x-ray. He thinks that the victim of advanced laryngeal cancer should at least be allowed the benefit of this method.—*Jour. A. M. A.*, January 31, 1903.

Cancer of the Larynx Cured by the X-Rays.—W. Scheppegrell (*N. Y. Med. Jour.*, December 6, 1902) reports a case of carcinoma of the larynx in which a complete cure was obtained by the x-rays alone. The growth involved the left wall and left vocal cord. A high tension Tesla coil was employed, and a tube with a medium vacuum was selected in order to gain some penetration. The face and chest were protected, but the neck was freely exposed in the hope that any involvement of surrounding glands might be influenced by the treatment. At first the platinum reflector (anticathode) was placed at a distance of fifteen inches, afterward this was reduced to seven inches from the neck. The exposure lasted ten minutes and was repeated daily for twenty days. No dermatitis developed. The platinum reflector was brought to a dull-red heat, and the vacuum was maintained about the same from the beginning to the end of the treatment. At the end of three weeks congestion seemed more marked and the tumor unchanged; pain, however, had disappeared after the second exposure. Some ten days later, upon examination, it was found that the tumor and most of the symptoms had disappeared. Treatment was recommenced and carried on for ten days, by which time the ulcers were healed. The patient, when seen three months later, seemed in good condition, the aphonia due to the loss of tissue of the left cord had been partially overcome by compensatory overaction of the other cord.—*St. Louis Med. Era.*, Feb., 1903.

Roentgen Ray in Cancer.—Medical Mirror gives a synopsis of a paper on this subject read by Dr. Charles W. Allen before the New York State Medical Society. Dr. Allen's work with the x-ray has not been experimental but follows the established practices of others. He considers the rays as an important and valuable supplement to one's armamentarium, but does not think that they supplant the older methods of treating these conditions entirely. Twenty-eight cases of cancer are presented, all of which have shown satisfactory progress. Eight of the patients have been discharged as apparently cured. One patient died after improvement had occurred. Four were looked upon as practically well, and thirteen are still under treatment. Five of the whole number were cancer of the breast, all recurrent; one of the rectum; one of the pelvis, secondary to removal of the uterus; one of lip secondary to operation; one of jaw, which was suspected to be sarcoma; two of nose; one multiple epithelioma of face, nose and eyes in a lad of 15, one globe being so widely involved that the sight was destroyed; the opposite eye being involved in a growth which had been pronounced non-malignant but which is clinically very suspicious of malignancy. In conclusion he says that (1) the method is one of decided value; (2) it is not without disadvantages and can cause serious troubles if unskillfully handled; (3) that the method will not wholly supplant the older methods, but has its decided place of utility.—*Am. Jour. Surg. and Gynecology.*

X-Rays in Lupus and Malignant Growths. Dr. T. J. Buchanan, of Philadelphia, reports a number of cases in the *Phila. Med. Jour.*, April 25, 1903. Case I, lupus of the nose and cheek. After several operative treatments without success the x-ray alone cured with 80 exposures. Case II, epithelioma of the cheek, nose, floor of the mouth and superior maxilla. The patient is 45 years of age. The sore began on the lower lip 12 years ago and was excised one year later. Present trouble began in the cheek July, 1901, and was excised in October following, along with some subaxillary glands. Recurrence followed in two weeks, so large as to be considered inoperable. X-ray treatment began January 9, 1902, with ten-minute exposure at 12 inches distance every third day. Improvement was immediate. When treatment stopped a short time the growth advanced. The mass has entirely disappeared. Case III, epithelioma of the nose in woman 65 years of age, had exposures of five minutes at intervals of three or four days. At the end of five weeks the nose was completely healed and there is no recurrence to date. Case IV, epithelioma of the nose and superior maxilla. Rapid growth begun from a wart two years ago. After excision the growth recurred. After the second x-ray exposure pain entirely ceased. After twenty exposures improvement is very great but the patient is not yet cured. Case V, lupus of the forehead in man aged 42, begun September, 1900. Exposed twice a week for five minutes. After 14 exposures the growth disappeared but recurred in one month. Eight more treatments were given, producing apparent cure. No recurrence since. Dr. Buchanan considers exposures of five to ten minutes long enough and has three or four days' interval between. He protects the surrounding tissue by sheet lead or tin foil, and has the tube two inches distant. He finds that a tube of medium high vacuum is better than a tube with a low vacuum. He prefers one that will make a good skiagraph of the hip joint of a normal person. He considers that only skilled operators should have charge of the treatment.

Epithelioma Engrafted on X-Ray Burn.—Dr. Lloyd (*Medical Record*, April 4, 1903) reports that at one time he had worked in Edison's laboratory with the x-ray. The tube maker there received very severe burns on his hands and head. Finally he lost all of the skin on his hands. He was skin-grafted in two or three hospitals, and finally returned to New York with an epithelioma developed on the x-ray burn of the right hand. This epithelioma grew rapidly while he was under x-ray treatment, and eventually Dr. Lloyd had been compelled to perform amputation.

Fibrosarcoma Cured by X-Rays—J. P. Torrey, M. D. (American Medicine, March 14, 1903), reports a case where a post mortem examination of the site of the tumor showed no trace of the fibrosarcoma. Surgery was resorted to at first and the tumor removed. The wound healed but afterwards reopened and discharged a bloody fluid. Later a recurrent nodule the size of a cherry was removed. The wound did not heal completely. Examination proved the growth to be a fibrosarcoma. Dr. W. B. Coley advised serum injections of the mixed toxins and x-ray exposures. Treatments were given two or three times a week from ten to fifteen minutes at about eight inches from the target of the tube. Injections were also used once or twice a week. Under this treatment, varied somewhat from time to time, the tumors entirely disappeared. The patient, not long afterwards died of typhoid fever and an examination of the scar and adjacent tissue showed no trace of sarcoma.

A Case of Rodent Ulcer of the Nose and Eyelids Treated with the X-rays.—The case is reported in the *Lancet* by Stopford Taylor, whose patient was a sailor aged eighty-two years. The condition has existed for some twenty years. Treatment was begun on May 15, 1901. A current of three amperes was used for twenty minutes twice weekly. From June 12 the sittings were increased to four times a week. Up to about August 19 healing had been very slow, but on this date treatment had to be suspended because of the sharp reaction, indicated by a sudden appearance of a dusky red erythema surrounding the ulcer, attended by the destruction of the newly-formed epithelium upon its surface and of the surrounding epidermis, brought about, I think, by change of the x-ray tubes from one of high vacuum to one of medium vacuum. It took five weeks for the effects of this reaction to disappear, when spontaneous healing began and was very rapid, for on October 15 the ulcer had cicatrized with the exception of a small area, which proved obstinate and where an application of potassa fusa had been made six years previously. On this date treatment by the x-rays was resumed, but they were applied to this unhealed spot only for ten minutes three times weekly, the newly-formed scar tissue being specially protected from their action with double lead foil shields.

Treatment was completed by December 20. At that time there was not the slightest evidence of the disease, neither has there been any recurrence. It is interesting to note also that the conjunctiva of the everted lower lid and that of the inner canthus was covered with a smooth layer of opaque horny epithelium and no trace of the puncta remained.—*Medical Record.*

No progressive physician can now afford to be ignorant of the principles of electrotherapeutics and x-ray and light therapy.

To the Editor of the American X-Ray Journal:

Sir:

I herewith report a case that was of interest to me and hope it may be of use to some of your readers.

On June 3rd, 1903, Mr. H. came to my office for treatment. About six hours earlier he had attempted to get on a moving car, missed his hold and fell to the ground.

On examination I found the right hand much swollen, and almost entire loss of motion from pain. Diagnosis: Sprain.

I applied the roller connected to a static machine on both front and back of hand, after that a medium tube at eight inches for five minutes; then an adhesive plaster dressing. Next day the swelling was slightly increased, the pain less and motion increased. Treatment the same. On the third day the swelling almost disappeared and there was no pain and normal motion. Treatment the same except that I left off the adhesive plaster bandage.

For three days his hand gave no trouble, so no treatment of any kind was used. On the fourth day he wrote all day and that night his hand was again swollen and painful. Treated him that same evening as at first, except using no bandage. Since then has been entirely well.

R. R. Farquhar, M. D.
Washington, D. C.

Correspondence is invited from other manufacturers upon the subject discussed by Waite & Bartlett in our last issue, regarding the best construction for static machines. Editorial comment is reserved until later.

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The Illustrated Review of Physiologic Therapeutics

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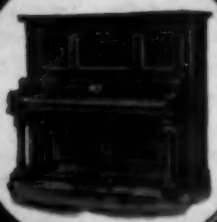

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